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Transport in Developing Countries and Climate Policy: Suggestions for a Copenhagen Agreement and Beyond

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Abstract

2009 is a crucial year in the international effort to address climate change. At the United Nations Climate Change Conference in Copenhagen, parties are supposed to establish a global climate agreement for the period after 2012 when the first commitment period of the Kyoto Protocol expires. While agreeing to deep emission cuts represents an enormous challenge in itself, the challenge becomes even greater from the sectoral perspective of transport in developing countries. Also in the global South, transport already significantly contributes to climate change and has high growth rates. Further rapid motorisation of countries in Asia and Latin America could counteract any climate efforts and aggravate problems of noxious emissions, noise and congestion.

This Paper aims at connecting the need for transport actions in developing countries to the international negotiations on a post-2012 climate change agreement. It outlines the decisions to be taken in Copenhagen and the preparations to adequately implement these decisions from 2013. Arguing, that a sustainable transport approach needs to set up comprehensive policy packages, the paper assesses the substance of current climate negotiations against the fit to sustainable transport. It concludes that the transport sector's importance should be highlighted and a significant contribution to mitigation efforts required.

Combining the two perspectives lead to several concrete suggestions: Existing elements of the carbon market should be improved (e.g. discounting), but an upscale of the carbon market would not be an appropriate solution. Due to a lack of additionality, offsetting industrialised countries' targets would finally undermine the overall success of the climate agreement. Instead, a mitigation fund should be established under the UNFCCC and financed by industrialised countries. This fund should explicitly enable developing countries to implement national sustainable development transport and mobility policies as well as local projects. While industrialized countries would set up target achievement plans, developing countries should outline low carbon development strategies, including a section on transport policy. Finally, the implementation of an agreement requires the definition of transport specific policy packages and assessment methodologies – the sooner the better.

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Abbreviations

AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action under the Convention
BAP	Bali action plan
BAT	Best available technology
BAU	Business-as-usual
BRT	Bus rapid transit
CDM	Clean development mechanism
CER	Certified emission reduction
COP	Conference of the Parties of the UNFCCC
EB	CDM Executive board
EC	European Commission
FDI	Foreign direct investment
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse gas
ICAO	International Civil Aviation Organisation
ICT	Information and Communication Technology
IEA	International Energy Agency
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LCDS	Low carbon development strategy
LDC	Least developed country
MRV	Measuring, reporting and verification
NAMA	Nationally appropriate mitigation action
NC	National communication
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
SD-PAM	Sustainable development policies and measure
SIDS	Small Island Developing States
TAP	Target achievement plan
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

Under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), developed countries (“Annex I countries”) committed to binding emission limitation and reduction targets. In aggregate, they committed to reducing their emissions by 5.2% below 1990 levels in the commitment period 2008–2012. Taking into account that the USA did not ratify the Protocol, the aggregate target in fact amounts to a reduction of 2.8% (EEA 2008: 29). Negotiations are currently underway for a new climate protection agreement for the period after 2012. Apart from new targets for Annex I countries, the negotiators are also discussing increased climate protection efforts by developing countries (“non-Annex I countries”), which are not subject to binding commitments under the Kyoto Protocol.

At the UNFCCC conference in Bali in 2007, parties agreed to jointly step up international efforts to combat climate change and to adopt a new agreement at the climate conference scheduled for Copenhagen in December 2009. The Bali Action Plan (BAP) (UNFCCC 2008a) showed a consensus for stronger action to address growing greenhouse gas (GHG) emissions from both developed and developing countries. This also acknowledges the fact that energy-related annual CO₂ emissions discharged from developing countries surpassed those from industrialised countries in 2005 (IEA 2008b), and that emissions from developing countries will account for more than 60% of global GHG emissions in most scenarios by 2020 (den Elzen, Höhne 2008). Recently, the European Commission proposed that developing countries should reduce their emission by 15–30% against a business as usual case by 2020 (EC 2009).

Slowing down the growth of emissions in core sectors in developing countries will be a major challenge for post-2012. This is especially related to the rapid development in emerging economy countries like India, China, Brazil etc. Hence, setting up financial mechanisms that support developing countries in their efforts is a key element of the BAP and during the negotiations of the agreement. This also means to better include the oil depending transport sector in mitigation efforts: The sector’s importance should be highlighted, a significant contribution required and funding made available¹.

¹ The dependence on oil is a main characteristic of the transport sector, only the rail sector includes significant shares of electricity. Fuel-cell technology or battery driven electric cars or trucks will continue to be high cost options, so a diffusion of these technologies is not very likely to occur during the next two decades.

Tackling the transport sector is one of the main hurdles to achieve any target: Transport accounts for 13,1 percent of global GHG emissions (IPCC 2007a)². This translates to 18 percent of global CO₂ emissions and 24 percent of energy related CO₂ emissions³ (IEA 2008a), and the share is growing. Financing low carbon transport systems is a key to changing this trend. The International Energy Agency (IEA) in its latest energy outlook (IEA 2008b) points out that including the transport sector in efforts to reduce CO₂ is essential to achieve the “2 degree target” (see Box 1).

This Paper aims at connecting the need for transport actions in developing countries to the international negotiations on a post-2012 climate change agreement. Only if (1) there will be enough funding in general and (2) funding is available and tailor-made for the transport sector, the upcoming climate agreement may achieve the necessary impact. But even if this is achieved, it is still necessary for the transport sector to realize and start using the options as early as possible. More specifically, two inter-related questions shall be discussed:

- a) How to consider sustainable development and prevent transport-related greenhouse gas emissions in developing countries in the design of a post-2012 agreement?
- b) How to use the momentum of a new agreement in Copenhagen in the transport sector and stimulate more sustainable transport policies in developing countries?

Starting with the description of motorisation trends and an analysis of barriers in the Kyoto regime to better include the transport sector (section 2), the Bali Action Plan and concrete suggestions to improve the framework are described (section 3). Based on this analysis, suggestions for better integrating the transport sector in a follow up agreement (section 4) are given. Assuming that such an agreement will be reached in December 2009, finally, an outlook suggests how transport actors can prepare themselves for making the agreement work (section 5).

² This is linked to IPCC Source Category 1A3, including transport-related electricity emissions (mainly for rail transport). Emissions from the manufacture of vehicles etc. are not included.

³ Whilst the principal GHG emitted from the transport sector is (energy-related) CO₂, other pollutants and effects should not be neglected: The IPCC (2007b) reports that N₂O accounts for 2-3 percent, while the share of methane (CH₄) is lower than 0.5 percent (fuel combustion). Aviation has a larger impact on radiative forcing than that from its CO₂ emission alone since emissions of NO_x, water vapour and particulates at altitude account for extra impacts. Furthermore, about 5 percent of transport GHG emissions are related to F-gases (ozone-depleting substances) that are not included in the Kyoto but the Montreal Protocol. These gases are mainly emitted due to vehicle air conditioning.

Box 1: The 2 Degree Target

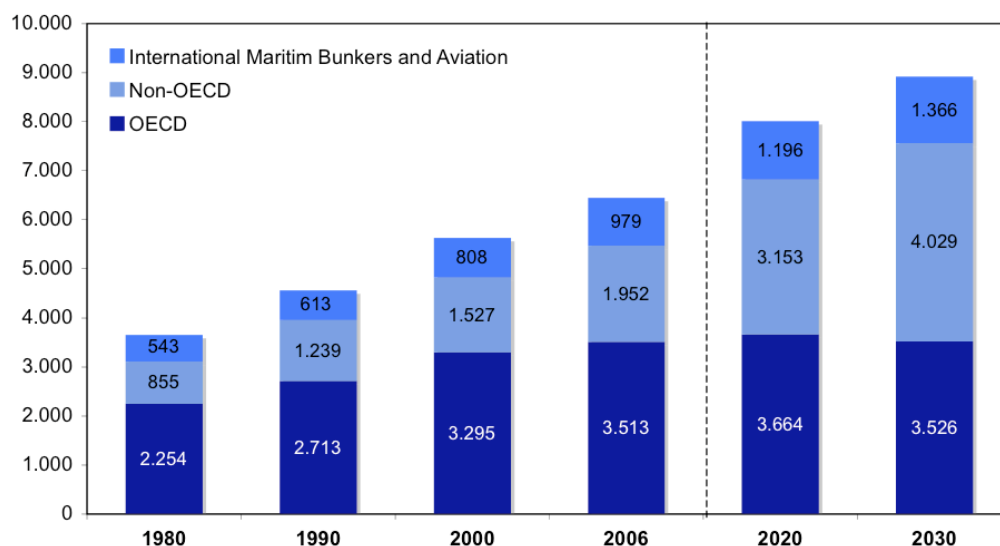
More and more parties of the UNFCCC accept limiting global mean temperature rise to 2 degrees centigrade above pre-industrial levels as being essential to avoid the most dangerous consequences of climate change. To achieve this aim great efforts are necessary. The lowest GHG stabilisation scenario evaluated by the Intergovernmental Panel on Climate Change (IPCC) so far is stabilisation in the range of 445–490 ppm CO₂ equivalents or 400-450 ppm CO₂. Stabilisation at this level is projected to lead to a temperature increase of 2-2.4 degrees (IPCC 2007b). Nasa Chief Scientist James Hansen (Hansen et.al. 2008) argues that stabilisation at 350 ppm CO₂ should be aimed for. A recent calculation of the Earth System Research Laboratory has shown that in the last years emissions growth exceeded even the most pessimistic scenarios of the IPCC. Current CO₂ concentrations in the atmosphere have already reached 383,9 ppm (6/2007- 6/2008 / ESRL 2009). The conclusion: urgent action is needed.

2 The Transport Perspective on Climate Change

Why are transport people interested in the UNFCCC process? Recent trends show that CO₂ emissions from the transport sector have become the most urgent challenge in industrialised countries. Between 1990 and 2007, transport has been the only sector in the European Union that failed to reduce CO₂ emissions. On the contrary, transport emissions have increased by 32.1 percent from 1990 to 2005 (based on European Commission 2008: 194). The emission share of transport in emerging economies and developing countries is still rather small, but growing even more rapidly. This trend is one of the key challenges for implementing climate mitigation policy (see figure 1).

Decisions taken under the UNFCCC regime in the next months will need to be implemented at a later stage. Transport is one of the areas that will be responsible. The targets and financial mechanisms that will be agreed upon in Copenhagen will set the future framework for implementation of sustainable transport policy.

Figure 1: Transport Sector Energy-Related CO₂ Emissions by Region in the IEA World Energy Outlook Reference Scenario (in million tonnes)



Source: own figure, based on World Energy Outlook, © OECD/IEA. 2008, Table 16.4, p. 393

The WBCSD (2004) expects that by 2040 transport related CO₂ emissions from developing countries will exceed those from industrialised countries. Currently, air pollution and noise are the most pressing issues in developing countries'

transport policy. However, one can learn from the transport development in the United States and in Europe that decisions that are taken today on land-use and development of car-friendly cities lead to more cars, more trips travelled by car and longer distances⁴. Such land-use patterns and infrastructure are very difficult to change and redesign and the impact on future GHG emissions will be huge. Therefore, take decisions now to avoid carbon lock-in in developing countries is still possible.

2.1 Motorisation as a Driver for CO₂ Emissions in Developing Countries

Taking this long-term path-dependency into account, climate change mitigation in the transport sector is an important topic for rapidly industrialising and developing countries. The growing income and the emergence of middle classes as in China and India leads to rapid motorization processes (Schipper and Ng 2004). This is especially the case in cities, therefore urbanization dynamics further stimulate motorization (Bongardt 2008). Hence, urgent action is needed as in developing countries and especially newly industrialising countries transport expenditures are high and cities and roads are being built every day. For example, China is going to invest 555,6 billion US dollars (CIDIF 2008) in its transport infrastructure from 2005 until 2010. This infrastructure will determine the way people and goods travel in the next 20-50 years. Due to the high costs for infrastructure, change at a later stage would be much more demanding and costly than preparing for low carbon land-use patterns and transport modes today.

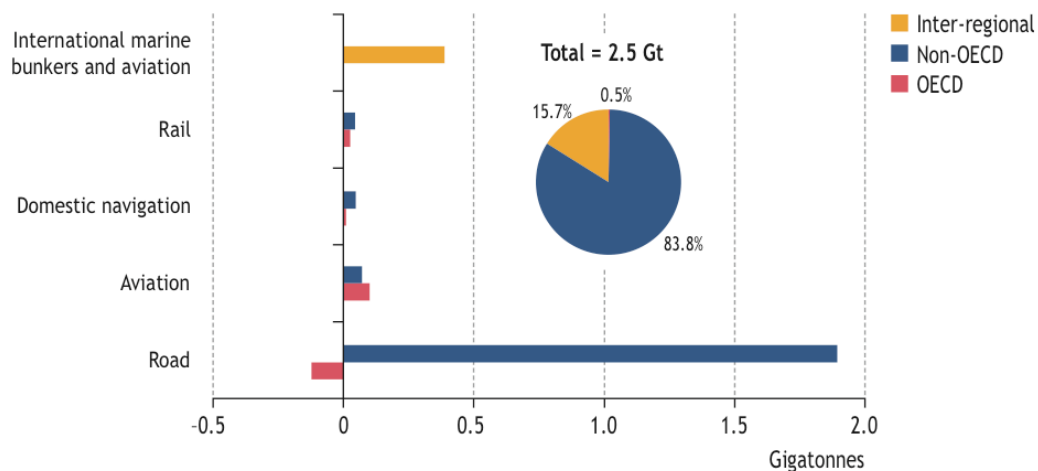
While transport has been an element of economic development and transport science has for a long time focused on the economic benefits of transport, 'limits to growth' also exist in the transport sector. The competition dynamics in the transport sector lead to both social and environmental impacts that are not acceptable from a sustainability perspective: While the poor cannot afford motorised transport, they suffer from the negative environmental consequences of the behaviour of the upper and middle class. Environmental degradation destroys the quality of urban life and traffic congestion leads to lower traffic speed and economic problems of cities.

So far, motorisation rates in developing countries have followed the trajectory of industrialised countries: For example, while the average rate in China is 10-20 cars per 1000 inhabitants, in Beijing the figure already stands at about 200. In Europe every second resident owns a car. Hence, future projections of the IEA show (figure 2) that until 2030 developing countries will be responsible for more

⁴ The different patterns of land-use in the USA and Europe significantly show that mobility and transport behaviour is not alone related to wealth but that spatial patterns play a major role.

than 80 percent (2.0 Gt) of the projected increase of energy related CO₂ emissions in the transport sector. This is mainly (1.9 Gt) due to an increase in road transport (freight and passenger) (IEA 2008b).

Figure 2: Change of Transport Sector CO₂ Emission by Mode and Region in the IEA World Energy Outlook Reference Scenario, 2006–2030



Source: World Energy Outlook, © OECD/IEA. 2008, Figure 16.10, p. 394

2.2 Climate Change Mitigation and Its Co-Benefits

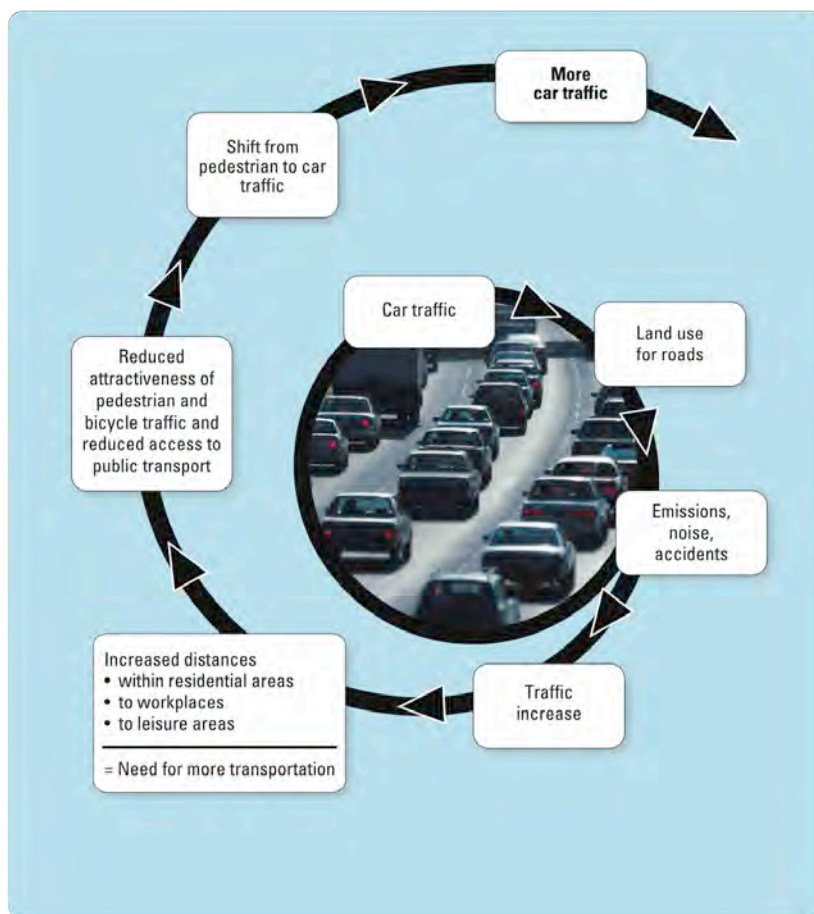
From a sustainable transport perspective, climate change is a key issue for the overall discussion. On the one hand, the challenging long-term consequences of climate change like sea level rise, droughts or more frequent extreme weather events are a major concern for future generations. Consequently, the avoidance of dangerous climate change is a core component in the idea of sustainability. On the other hand, climate change mitigation can have several co-benefits and alleviate other negative impacts of transportation. Especially strengthening energy efficient transport modes like public mass transit and bikes as an alternative to cars, or rail instead of trucks, would lead to better affordability, less pollutants, a reduction of noise, better access and less land consumption. These co-benefits mainly appear if a policy or measure aims at reducing distances and the number of trips (avoiding transportation needs) or supports more environmentally friendly transport modes (modal shift to more efficient modes).

However, even actions to increase fuel economy (energy efficiency of motor vehicles) have a positive impact on air quality as less fuel consumption means fewer pollutants. Considering these co-benefits, GHG reduction measures in the transport sector have a high potential to contribute to sustainability targets and commitments, such as the millennium development goals. The traditional

response to increasing traffic - construction of more roads – has shown not to achieve the desired outcome but has led to even more traffic and more pollution instead. These dynamics of the traffic spiral, recently described by Petersen (2004) and visualized in figure 3, show the importance of an alternative approach, the idea of sustainable transport systems.

Figure 3: Traffic and Land-Use Interaction (the ‘Traffic Spiral’)

Traffic spiral reasons for increased traffic



Source: Wuppertal Institute

2.3 Current Status of Transport in the International Climate Regime

2.3.1 Transport in Industrialised Countries

So far, the international climate regime has not addressed individual sources or sectors of GHG emissions. Instead, Parties opted for a “targets and timetables” approach covering total emissions: Annex I countries assumed legally binding

targets for their total national GHG emissions in the period 2008-2012. In which sectors and by what measures countries would reduce emissions to meet these targets was left to their discretion. Hence, GHG emissions from domestic transportation (including domestic aviation and shipping) in industrialised countries are included in national emission reduction targets. As outlined above, emissions in the transport sector in industrialised countries have grown rapidly despite adoption of the Kyoto Protocol.

International aviation and shipping are not included in the emission targets of industrialised countries due to the international character of these sectors⁵. Instead, the UNFCCC called on the International Civil Aviation Organisation (ICAO) and the International Maritime Organization (IMO) to address GHG emissions from international aviation and shipping. However, discussions in ICAO and IMO have stalled.

2.3.2 Transport in Developing Countries

Developing countries have so far not had to assume legally binding emission reduction obligations. Nevertheless, there are two mechanisms under the UNFCCC whereby developing countries are involved in emission reduction activities: The UNFCCC's financial mechanism and the CDM.

The UNFCCC's financial mechanism is operated by the Global Environmental Facility (GEF). The GEF is the designated financial operator for a number of multilateral environmental agreements, namely on climate change, biodiversity, and persistent organic pollutants. The GEF is to assist countries in meeting their obligations under the conventions that they have signed and ratified. The GEF UNFCCC Trust Fund includes a programme on sustainable transportation projects under the budget line for climate change mitigation. Since its pilot phase the GEF has provided 3.3 billion USD to climate change projects in total and leveraged co-financing in excess of USD 14 billion or USD 4.2 per dollar of GEF grant (UNFCCC 2007: 164). Until now, the GEF has approved 166 million USD (triggering 2.1 billion co-funding) for 23 transport projects that include e.g. Bus Rapid Transit (BRT) systems and approaches for non-motorised transport⁶.

The second instrument that currently involves developing countries in emission reduction efforts is the Kyoto Protocol's Clean Development Mechanism (CDM). It is an arrangement allowing industrialised countries with a GHG reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to domestic emission reductions. Industrialised countries can purchase Certified Emission Reductions (CERs) from CDM project activities and count these towards their Kyoto targets.

⁵ However, aviation will be included in EU emission trading from 1st January 2012.

⁶ An overview of GEF sustainable transport projects is available at: <http://gefonline.org/home.cfm>.

So far, the CDM has failed to foster transport-related project activities. The majority of CDM projects has been developed in the industrial and energy sectors, mostly using single, isolated technological devices. In contrast to that, the transport sector is rather complex, being influenced by social, economical, political and/or cultural factors. Furthermore, activities in the transport sector usually involve a high number of (mostly public) actors. This often leads to conflicts of interest. Also, many public (transport) actors lack profound knowledge of the CDM process. Usually, consultancies provide this knowledge. They get paid from the certified emission reduction (CER) revenues and therefore search for the cheapest possibility to generate GHG emission reductions. However, few incentives exist for using the CDM in the transport sector. This is due to the facts that firstly, the CDM process causes high transaction costs and secondly, CDM financing in the transport sector covers just a marginal part, usually less than 2% (Sanchez 2008) of the overall costs of the often large-scale infrastructure activities. As of February 2009, only 2 out of 1766 registered CDM projects are transport projects (without fuel switch projects) and 7 transport projects are in the pipeline (UNFCCC 2009a, see Annex 1).

Reasons for the Failure of CDM Projects in the Transport Sector

Unlike CDM projects in many other sectors, activities in the transport sector do not only result in reducing CO₂ and accompanied GHG emissions, but have a broader approach encompassing co-benefits like other environmental benefits or enhanced mobility and economic growth (Sanchez 2008). What you win in terms of co-benefits, you lose in having simple projects. The complexity of many transport activities like behavioural or legal changes can barely be captured in the rather stringent CDM-procedures that have been developed for single project approaches. Therefore, transport CDM projects face various methodological difficulties (Wittneben et al. 2009, Sanchez 2008).

CDM projects have to set several parameters. The investment that would be made and/or the business approach that would be taken in the absence of the project, the so-called reference scenario, have to be determined. The project developer has to estimate the emissions that would result if the reference scenario occurred. The estimate is known as the baseline. The baseline is then compared with a forecast of the emissions that would occur if the project activity was implemented. (Sterk and Arens 2008). For these calculations reliable data is needed, which appears to be particularly difficult for transport project activities. For instance, a comparison of baseline and project emissions for modal shifts has to account for a high number of small and mobile emission sources. The complexity will increase if one considers factors like change of land use or change of driving behaviour (Sanchez 2008). Even a switch from fossil to biofuel is difficult to estimate, as the emissions of the whole supply chain for the biofuel have to be tracked (well-to-wheel).

Another crucial part of the CDM process is to prove “additionality” of the project (Wittneben et.al. 2009), meaning that the reductions in emissions would not have occurred without the project activities. As transport is a key function of urban life, it is rather difficult to show that a project would not have been carried out due to institutional, technological, behavioural or mainly financial barriers.

2.4 Policy Packages for Sustainable Transport

Considering the ever-increasing amount of GHG emissions in the transport sector, there is still a potential for transport projects under the CDM and elsewhere. Taking the limitations of the project-based mechanisms of the current carbon market into account, lessons can be drawn from the policy perspective of how to achieve a low carbon transport system⁷: Tackling the transport sector means that a comprehensive set of policies is needed at different levels, from national to local (Höhne et al. 2008). Possible policies at the national and the local levels are well known and a number of good practice examples show the options for policy makers (cf. Dalkmann and Brannigan 2007). Such policy packages for sustainable transport need to include approaches that target space and infrastructure (that predetermines behaviour), behaviour preferences and technology (Kern 1997). To implement these approaches, policies include investments, financial incentives (positive and negative) and regulation (see table 1).

In general, two major strategies can make transportation systems more energy efficient:

1. Avoiding transportation needs and promoting a modal shift to more efficient modes (infrastructure plus behaviour related approach), and
2. Increasing the energy efficiency of motor vehicles (technology related approach).

Both are needed, but while technological approaches are short-term measures, behavioural and infrastructure-centred measures need a long-term perspective. As the term “strategy” suggests, not only one policy but a policy package is necessary for each strategy to achieve a better environmental performance of transport systems. Table 1 shows the range of policy options and the linkages between them that can be used to design effective policy packages for both strategic approaches. In order to design feasible policy packages, the institutional setting requires further differentiation along levels (national vs. local) and sub-sectors (passenger vs. goods transport).

⁷ International aviation and maritime transport have to be addressed at the global level and new sectoral agreements might be necessary.

Table 1: Composition of Policy Packages for Sustainable Transport

	Strategy 1 - Avoid transportation needs and shift to energy efficient modes		Strategy 2 - Increase energy efficiency
	Infrastructure-centred	Behaviour-centred	Technology-centred
Public investment	<i>National:</i> Limitation of highway and airport construction, investment programme for public transport and non-motorised modes <i>Local:</i> Investment in public transport (e.g. BRT, Metro) and non-motorised modes (e.g. pedestrian areas, bike lanes etc.)	<i>National:</i> Investment programme for ICT in public transport <i>Local:</i> Communication strategy for public transport and non-motorised modes	<i>National:</i> R&D spending for clean technology <i>Local:</i> Procurement of clean vehicles, electronic ticketing
Economic incentives	<i>All levels:</i> Financial support (taxes, tax discounts) on compact cities, non traffic-intensive land-use	<i>National:</i> Energy taxes in order to internalize external costs like e.g. health <i>Local:</i> Parking fees, ticket pricing, city tolls	<i>National:</i> Tax incentives for clean technologies <i>Local:</i> toll exemption for clean vehicles
Regulation	<i>All levels:</i> Active land-use planning and rules for compact cities, environmental impact assessment	<i>National:</i> Speed limits, eco-driving requirements in driving lessons <i>Local:</i> parking restriction, car access restriction, car-free days	<i>National:</i> Ban of dirty technologies, standards for phasing in BAT, quota for alternative fuels <i>Local:</i> Ban of dirty vehicles, low emission zones

Source: own compilation

At the national level, decision makers can mainly influence vehicle energy efficiency and modal shifts. The former could be fostered by taxes, “feebates”, speed limits or road tolls. Allocating funding to low carbon infrastructure investments could facilitate the latter. In the European Union, Member States are required to submit national energy efficiency action plans, which shall outline a national saving target and the corresponding policies and measures to achieve this target (EC 2006). Thereby the Member States are currently gaining first

experience how to link energy saving targets to policy packages and measures in the transport sector and how to evaluate energy savings.

At the local level, decision makers can mainly influence modal shifts and transport avoidance. Transport and urban planning is an opportunity to adjust and specify the policy elements that are needed to substantially reduce GHG emissions and further negative environmental impacts. Planning processes not only include a mid-term perspective on development but can also refer to different policy levels and the distribution of responsibilities, e.g. urban planning can anticipate rising energy taxes and the impacts on transport behaviour.

Policy packages must be carefully adapted to the needs in the different countries, regions and cities. The composition of specific policy packages should focus on overcoming the barriers to sustainable transport behaviour. Such barriers could be manifold, e.g. financial incentives like subsidies for fuels or high investments in clean technology, time incentives like speed differences between modes, information gaps or even symbolic barriers like associating public transport with a lower social status. Nevertheless, many good practice examples like Curitiba or Bogotá, Portland or Singapore, Zurich or Muenster show that the right policies are able to revise the dynamic of the vicious cycle of more and more car journeys (traffic spiral) into a virtuous cycle of fewer car journeys, more equity and higher quality of life (Levett 2007).

Scenarios established by the International Energy Agency (IEA 2008b) show that globally, without tackling the transport sector, the best result would be a stabilization of CO₂ emissions at 1990 level. The conclusion is simple: The transport sector must be included in climate mitigation policies. Emission targets and financing GHG emission reductions could be a strong incentive for transport decision-makers to move into this direction. But it is not just financing: In order to achieve effective mitigation, it is necessary to actively encourage sustainable transport activities in the framework of a future UNFCCC agreement and foster well-adapted **transport policy packages** at the different levels of decision-making.

3 The Configuration of the UNFCCC Negotiations

This section gives an introduction to the international climate change negotiations, especially the Bali Action Plan and the configuration of negotiations of a post-2012 climate agreement. It will be used as basis for analysis of (a) what could be achieved in the process towards Copenhagen and (b) what do we have to expect “beyond Copenhagen”, i.e. what may be a framework for climate change mitigation in the transport sector.

3.1 A Question of Effort Sharing

From the beginning, the international climate negotiations have been characterised by the conflict on effort sharing between industrialised and developing countries as well as among industrialised countries: who should take action, when should such action be taken, and what is the necessary extent of such action? Effort sharing includes sharing commitments to mitigate climate change, sharing the costs to achieve the mitigation commitments, and sharing the costs to recover damages (adaptation to climate change). The basic principles of effort sharing were agreed in Article 3 of the Framework Convention, which stipulates that:

The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse affects thereof.

Article 4 of the Convention lays out the basic balance of the deal between Annex I and non-Annex I countries. Art. 4.1 (b) commits all Parties to “Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change (...)”. Furthermore, Art. 4 requires Annex II countries, these are the most wealthy industrialised countries, to financially and technologically support non-Annex I countries to enable them to implement the Convention and clarifies that “The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country

Parties of their commitments under the Convention related to financial resources and transfer of technology ...”

In line with the provision that industrialised countries should take the lead, the Kyoto Protocol commits only industrialised countries to binding quantified emission limitation and reduction targets, whereas developing countries did not adopt emission targets. Furthermore, the targets are differentiated, ranging from –8 percent for the EU to +10 percent for Iceland.

3.2 Establishing the Post-2012 Negotiation Parameters

The conflict between industrialised and developing countries has again heated up since the initiation of the negotiations on the future of the climate regime after 2012, when the first commitment period of the Kyoto Protocol (KP) expires. Article 3.9 of the KP requests the Parties to initiate considerations on post-2012 commitments for Annex I Parties at least seven years before the end of the first commitment period, i.e. in 2005. Hence, discussing a mandate for negotiations on post-2012 commitments became a main agenda item of the climate conference in December 2005 in Montreal.

Although Article 3.9 KP only addresses future commitments of Annex I parties, in Montreal most industrialised countries aimed at broadening the process to other parties. While Annex I parties argued that strengthened action by the major developing countries was a precondition for taking on any new commitments, non-Annex I parties insisted that Annex I parties take the lead by determining their further commitments and to transfer technology and financial resources necessary for controlling GHG emissions in non-Annex I countries. The G-77 & China clearly stated that “no new commitment shall be introduced under the Protocol for Parties not included in Annex I”. In the end, parties agreed on the establishment of an “open-ended ad hoc working group of Parties to the Kyoto Protocol” (AWG-KP) dealing exclusively with Annex I commitments.

In parallel to this “Kyoto track”, a second post-2012 process was started under the Convention. The underlying motivation for this “dual track” approach was to allow for broader coverage, both on substance – to also include adaptation and a focus on technologies and development goals – and participation – to also address Convention parties that have not ratified the Protocol, namely the USA. However, due to continuing US resistance to engagement in the climate regime, the final decision of the Conference of the Parties (COP) on this “Convention Track” was rather weak. It was not even called a process but instead a “dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention” (Wittneben et al. 2006).

Against this background, the Bali conference evidenced a remarkable change of strategy by the developing countries, in particular the rapidly industrialising countries. Whereas previously they had always pointed to the responsibility of industrialised countries and rejected adopting any commitments themselves, they now showed an unprecedented dedication to fighting climate change and established themselves as forceful players. One after the other, the large rapidly industrialising countries took the floor to announce that they were willing to do more, to contribute their “fair share” to the fight against climate change.

In addition, the USA finally gave up resistance to be involved in meaningful negotiations. Through the adoption of the so-called Bali Action Plan (BAP), the previous “dialogue” was hence transformed into a real negotiation process and a second ad-hoc working group was established (AWG-LCA). The BAP calls for addressing four main “building blocks”: mitigation, financing, technology and adaptation. On adaptation the question is how to cope with climate change and how to organize funding and technology transfer. On mitigation, for developing countries the BAP calls for “nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.” For developed country parties, the decision calls for consideration of “Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives” while “ensuring the comparability of efforts among them.” The building blocks finance and technology include further details on the kind of support industrialised countries should provide to developing countries to help them address their emissions (Watanabe et al. 2008).

While the BAP thus reiterates the core balance at the heart of the Annex I-non-Annex I debate laid down in Article 4 of the Convention, it significantly raises the bar for both sides. For developing countries, the debate has shifted from the qualitative commitments under Article 4.1 of the Convention to mitigation actions that are quantifiable, for this is what lies at the heart of monitoring, reporting and verification. For developed countries, the BAP also constitutes a step change from the past, where support for developing countries was mainly delivered through voluntary contributions to funds and any technology transferred was neither measurable nor reportable nor verifiable. With the BAP, developing countries are supposed to undertake quantifiable nationally appropriate mitigation actions (NAMAs) and these are to be supported by developed countries in an equally quantifiable manner.

3.3 Substance of the Negotiations

Both ad-hoc working groups established by the BAP contain negotiation topics relevant to this paper. The following section will lay out the proposals for reforming the flexible mechanisms and the proposals for increasing efforts by developing countries that have been tabled so far. Section 3.4 will then assess to which extent these proposals have potential for an increased involvement of the transport sector in mitigation activities.

3.3.1 AWG-KP: The Future of the Flexible Mechanisms

Apart from negotiating future Annex I emission targets the AWG-KP also negotiates the future of the flexible mechanisms such as the CDM since industrialised countries can count CERs generated by CDM projects towards their targets. So far, these talks have yielded a very long list of proposals for reforming the CDM for the period post-2012. These discussions take place against the background of widespread criticism of the current CDM. Apart from the imbalance between sectors as discussed above, several studies highlighted that the CDM approval process fails to effectively screen out projects that are not “additional” (e.g. Schneider 2007; Wara and Victor 2008): **Awarding CERs to non-additional projects means that reductions in industrialised countries are replaced by fake reductions in developing countries, that is, global emissions are higher than if there was no CDM.** In the following, the term ‘carbon market’ is closely linked to this danger of international emission trading.

Based on the current synthesis text by the chair of the negotiations on the flexible mechanisms (UNFCCC 2009b), the following lists and briefly explains the main options that have been proposed in the negotiations and have some relevance for transport. In 2009, negotiators will have to narrow down this list and operationalise the options that remain.

*Introduction of **sectoral crediting** of emission reductions below a previously established **no-lose target***

The fundamental idea behind this proposals is to transcend the project-based approach of the current CDM. Sectoral no-lose targets would function like the CDM in the sense that credits would be awarded if emissions in a defined sector were kept below a certain pre-agreed level, but no penalties would be applied if the target was not kept. The no-lose target could be set below BAU. This would mean generating less CERs and overcoming the zero-sum nature of the current CDM.

*Ensure environmental integrity and assess additionality through the development of standardized, **multi-project baselines***

Multi-project baselines are essentially benchmarks for specific activities. This proposal was basically developed for certain very similar CDM project activities, such as emission reductions in cement production, e.g. in terms of emissions per tonne of produced cement. In this example, cement factories that stay below the benchmark would receive credits.

*Ensure environmental integrity and assess additionality through the development of **positive or negative lists** of project activity types*

A positive list as proposed here would mean to establish a list of project types that are assumed to be nearly always additional and thus would not be required to undergo project-by-project additionality testing. For instance, installation of solar photo voltaic is typically much more costly than alternative energy sources and hence would not be undertaken if no additional financing was provided. A negative list would exclude specific project types that are assumed to nearly always be non-additional from eligibility. Establishing an exclusion list to screen out the most negative types of activities is a practice that is followed by many major international organisations, including the multilateral development banks. Currently, the CDM excludes nuclear power projects. Establishing a negative list would mean to go further down this route by adding further project types.

***Include co-benefits** as criteria for the registration of project activities*

In the current CDM, it has so far been the prerogative of the host countries to determine whether a project contributes to sustainable development. The proposal here aims at establishing criteria for sustainable development as well as a process for assessing these criteria at the international level. The Chair's text contains two options:

- Projects that demonstrate specific co-benefits shall be promoted, for example by exempting them from fees
- Projects shall demonstrate specific co-benefits as a requirement for registration, i.e. projects that do not demonstrate co-benefits would not be eligible for registration.

*Introduce **multiplication factors** to increase or decrease the certified emission reductions issued for specific project activity types*

The essence of this proposal is to increase or decrease the number of CERs issued for specific project types. Project types that are desired could thus be rewarded

whereas project types that are seen negatively could be penalized. This is similar to positive and negative lists. However, while discounting of CERs in specific projects may be a good solution to correct the market, the multiplication of CERs would lead to higher emissions in the industrialised countries and thus is not beneficial from a climate perspective.

Differentiate the eligibility of Parties through the use of indicators

This proposal is to differentiate Parties according to certain criteria reflecting their aggregate national wealth and socio-economic capacity. The higher a country's score in these indicators, the more its eligibility to host CDM projects would be phased out. The Chair's text contains two options: either that Parties meeting the specified criteria should not be able to host CDM projects at all, or that they should not be eligible to host particular types of projects.

3.3.2 AWG-LCA: Nationally Appropriate Mitigation Actions by Developing Countries Coupled with Financial and Technological Support

The key provision for developing countries in the Bali Action Plan can be broken down into the following elements:

- Developing countries are to undertake mitigation actions.
- These are to be nationally appropriate, i.e. tailored to countries' national circumstances and in line with the Convention's principle of common but differentiated responsibilities.
- They are to take place in the context of sustainable development, meaning they are to be embedded in the countries' broader sustainable development strategies.
- They are to be monitorable, reportable and verifiable, i.e. quantifiable.
- They are to be supported by developed countries in an equally quantifiable manner.

The concrete meaning of sustainable development with low emission will differ from country to country according to their national circumstances, including geographical circumstances and level of economic development. Similarly, the appropriate magnitude of financial and technological resources to enable low-emission developments will also depend on national circumstances. Each non-Annex I country has its own development objectives and the most suitable way to achieve low-emitting development paths, as well as very diverse capability to pay.

A clear consensus on the exact nature of NAMAs and mechanisms for support has yet to emerge. Developed countries as well as some developing countries, stress that these actions should lead to an appropriate deviation from the projected

emissions baseline. Nevertheless, developing countries emphasise that NAMAs should be voluntary and correspond to the capabilities of each Party. By contrast, industrialised countries and in particular the USA have put forward the position that at least for some countries (such as major emitters and emerging economies) NAMAs should be of the same kind as actions by developed countries. Moreover, the USA stresses that actions by all countries should be of the same legal character, i.e. either voluntary or binding, only the substantive content may differ between countries. Also Australia and Canada demand legally binding actions by developing countries (UNFCCC 2008b). In particular the following proposals for what NAMAs could comprise have been put forward (UNFCCC 2008b):

Sustainable development policies and measures (SD-PAMs)

The concept of “SD-PAMs” was introduced by South Africa several years ago already. It refers to policies and measures that primarily focus on a country’s sustainable development but achieve emission reductions as a “co-benefit”. One example would be housing programmes for the urban poor that contain high standards for the buildings’ energy demand. Another example could be the promotion of non-motorised and public transport.

National low-carbon development plans and strategies

This proposal has been put forward in particular by the EU. According to the recent post-2012 communication by the European Commission (EC 2009), developing countries should limit their emissions to 15-30% below business-as-usual projections. To this end, all developing countries, except least developed countries (LDCs), should commit to adopting low-carbon development strategies by the end of 2011. Robust and verifiable low-carbon development strategies would be a prerequisite for access to international support for mitigation action. The strategies are to set out a credible pathway to limit the country’s emissions through NAMAs covering all key sectors, especially power, transport, major energy-intensive industries and, where significant, forests and agriculture.

The strategies should identify the support required to implement the proposed NAMAs resulting in incremental costs that cannot be sustained by the country itself. The strategies should be subjected to a technical assessment. This assessment should also assess whether the overall level of ambition pursued in a plan is in line with the capacity of the respective country to take action and appropriate for achieving the overall emission reduction of 15–30% compared to the baseline. Where necessary, the assessment should explore options to raise the level of ambition.

*Increased participation in the **carbon market**, inter alia through sectoral emission trading systems, sectoral no-lose crediting baselines, and rewarding NAMAs with credits*

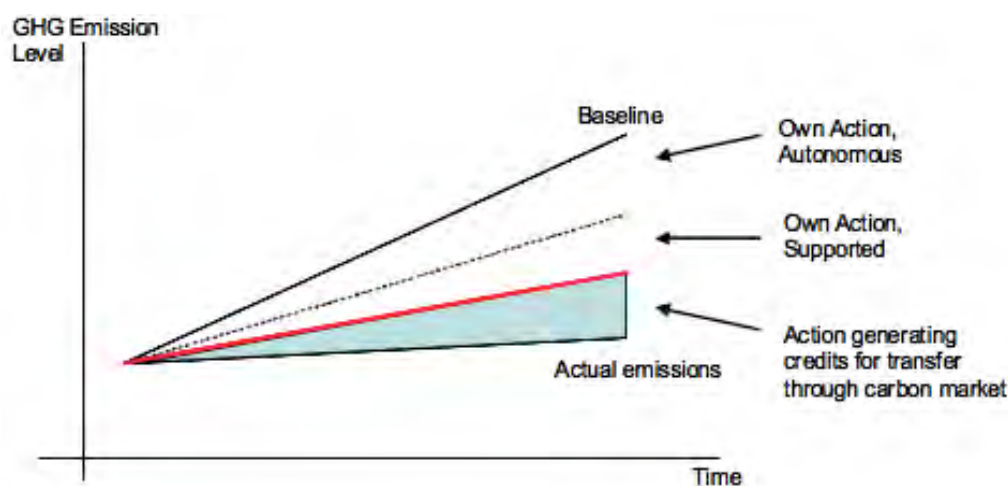
In the context of the negotiations on the flexible mechanisms (see section 3.3.1), it has been proposed to link NAMAs to the carbon market. The proposed text would allow NAMAs to be registered as CDM projects. This proposal has not yet been well defined, however. It would seem to be related to earlier discussions about introducing a policy-based CDM, i.e. introduce crediting for the introduction of specific policy instruments such as fleet emission limits or fuel efficiency standards. In contrast to sectoral no-lose targets, which would credit the aggregate performance of whole sectors, this option would hence retain the current CDM approach of crediting individual actions such as policies and sector-wide programmes.

Overall, there seems to be growing consensus that NAMAs should be inscribed into some form of international registry and that this registry could be used as a platform to bring together actions by the South and resources from the North.

The EU has proposed that there should be three layers of NAMAs:

- Actions implemented unilaterally by a country
- Additional actions supported by technology, financing and capacity building
- Further actions supported through the carbon market

Figure 4: EU View of Future Developing Country Emissions



Source: EC 2009

However, the EU position has been criticized by UNFCCC Executive Secretary Yvo de Boer as asking developing countries to go beyond than what was agreed in Bali (Harrabin 2009). Other critics from the global South agree and point out that the suggested approach would set up the carbon market to compete with autonomous efforts by developing countries since the market would capture low-cost emission reduction potential and the reductions would then be counted towards Annex I targets rather than towards non-Annex I efforts (Third World Network 2009).

3.4 Analysis of Options from a Sustainable Transport Perspective

Based on the proposals presented in the previous section, the following analysis focuses on the sustainable transport perspective. Therein, similar proposals have been summarised to avoid duplication. As there is some overlap between the two AWGs, the one where each respective proposal is negotiated is mentioned in the heading.

Sectoral No-Lose Targets and Crediting of NAMAs (AWG-KP and AWG-LCA)

Sectoral and policy-based crediting lend themselves much better to transport than the current project-based CDM. For sectors such as transport, which the carbon market has so far had difficulties to reach, sectoral approaches could potentially provide a stimulus for Southern governments to introduce policies and measures that redirect investments in these sectors. Browne et al. (2005: 64-66) argue that a sectoral approach would make it possible to implement, for example, fuel efficiency standards or comprehensive traffic management as CDM projects.

Sectoral and policy-based crediting imply to establish the baseline and additionality at an aggregate level instead of for specific investment projects. They would thus have the advantage of removing the necessity to determine the additionality of individual investment decisions, which is hardly possible in most cases. However, these approaches also pose new challenges for baseline-setting and additionality-testing. The challenge is particularly complex with regard to policy-based crediting.

In order to prevent situations where Southern countries hesitate to introduce climate-friendly policies in order not to render CDM projects non-additional, the CDM Executive Board decided that the baseline of projects may be based on a hypothetical scenario without policies introduced after 2001 (UNFCCC 2004). In line with this decision, the baseline of a policy-based scheme might be defined as the situation without the policy.

But what would additionality mean for policy-based schemes? Several aspects appear to be problematic:

- Would a government have to prove that it is adopting a policy solely because of climate change considerations? Would this even be possible given that policies are usually introduced for a variety of reasons and that GHG emission reduction policies in the sustainable transport arena and in general usually entail a number of benefits, such as the reduction of pollution, technology promotion, decreased dependence on fossil fuel imports etc.?
- It would also be very difficult to determine for how long a policy would not have been implemented in the absence of the CDM.
- Moreover, baselines and additionality testing would need to be dynamic since for example an efficiency standard may be very stringent at the time of introduction but over time it will become common practice.
- Furthermore, it may in many cases be impossible to establish a direct link between a policy and the climate benefit achieved, since policies typically intervene in complex environments where many factors come into play. If a government, for example, introduces vehicle fuel efficiency standards and consequently a drop in transport emissions is measured, it would be necessary to differentiate to what extent this drop has been a result of the government policy and to what extent it has been due to other factors such as rising fuel prices.

The sector/target-based approach removes this difficulty by simply assessing the performance of a sector as a whole instead of trying to evaluate individual activities or policies. However, the quantification of emissions and reductions for both, policy- and sector-based approaches, would have to rely on modelling and projections, which always possess a degree of uncertainty. Projections at an aggregate level may therefore be more reliable regarding additionality testing, but they might be more unreliable regarding the achievements.

Even if industrialised countries committed to much more stringent targets, establishing a robust baseline at the sectoral level would necessitate having detailed and reliable emission inventories and projections for the host countries or at least for the sectors covered, also for the transport sector. The reliability of emission monitoring would also need to be ensured. At the moment, probably only a few, if any, Southern countries dispose of the necessary technical capacity and data infrastructure. This would also mean to improve the data availability of the transport sector.

*Ensure environmental integrity and assess additionality of CDM/sectoral CDM through the development of standardized, **multi-project baselines** (AWG-KP)*

Multi-project baselines could be an adequate means to foster technology-centred approaches, i.e. to increase vehicle energy efficiency activities. For certain activities the project developers could apply the average fuel consumption per vehicle kilometre as a standardised indicator, while assuming other parameters such as occupancy levels and distances covered to remain unchanged. The IPCC already provides standardised fuel efficiencies for pre-defined vehicle categories and technologies (IPCC 1997). Hypothetic examples for corresponding activities are fleet management systems or hybrid buses. If for instance the fuel efficiency of 100 buses were improved by 10 litres / 100 kilometres with respect to a standardised baseline, then roughly 4,000 t CO₂ would annually be saved⁸.

Standardized baselines seem to be ill-suited to avoid transportation needs and to foster modal shifts. Overall indicators that describe the environmental performance of the infrastructure/behaviour related approach are e.g. Person/tonne kilometre per unit GDP or the modal split (see section 2.3). However, an appropriate operationalisation might be too difficult or too case-specific, especially as these indicators would not account for geographic and other local circumstances.

***Differentiation of Project Types and/or Parties** (AWG-KP)*

Positive lists would not seem to hold much prospect for the transport sector as it can hardly be argued that any transport measure is nearly always “additional” in the sense that it would not be undertaken if there was no reward for the emission reduction it achieves.

A negative list might improve the relative attractiveness of transport projects. In terms of volumes of CO₂, the CDM is currently dominated by very few projects that achieve high emission reductions at very low cost. For example, the climate impact (called global warming potential) of the industrial gas HFC-23 is 11,700 times that of CO₂. This means that each tonne of HFC-23 reduced in a CDM project yields 11,700 CERs. If such project types with very cheap emission reduction potential were excluded from the CDM, higher cost options such as transport projects could become more attractive. A similar effect could be achieved if the emission reductions from these projects were discounted, as would be possible with the introduction of multiplication factors.

⁸ In this example, the assumptions are: 2.65 kg of direct CO₂-emissions per litre of diesel and 150,000 vehicles kilometres travelled per year.

In the same vein, the proposal to differentiate host countries also holds some potential to increase the relative attractiveness of transport. If sectors that are more accessible to the CDM such as power generation and industry were excluded from the CDM in the more advanced developing countries in order to be subjected to other mechanisms, CDM market actors would need to pay more attention to identifying project opportunities in the remaining sectors. While these proposals might improve the standing of transport projects by pulling down other options, it may be over-optimistic to assume that this would lead to a significant shift of attention towards transport.

The proposal to include co-benefits as criteria might improve the standing of transport based on its own merits. As outlined above, transport projects are particularly likely to achieve co-benefits in addition to GHG reductions, such as reduction of noise or local pollutants. If achievement of such co-benefits was rewarded with preferential treatment, many transport projects could gain a competitive advantage vis-à-vis low-cost end-of-pipe projects that currently dominate the CDM pipeline. However, assessing co-benefits also leads to higher costs and further methodological problems.

*Sustainable development policies and measures and **national low-carbon development strategies** (AWG-LCA)*

The proposal to internationally register and support specific policies and measures can easily be conceived as a vehicle to promote sustainable transport policies. The challenge is to determine what kind of international support would be required as well as the appropriate monitoring, reporting and verification of the emission reductions that have been achieved. The problems may be very similar to those discussed for a policy-based CDM above, in particular if each SD-PAM is to be assessed individually.

Comprehensive national low-carbon development plans and strategies could easily be conceived in the form of comprehensive policy packages as discussed in section 2.4. In order to include transport in these strategies it is important to mention and outline the sector explicitly already in the Copenhagen agreement. Furthermore, as transport is not a homogeneous sector, defining sub-sectors (e.g. long distance goods transport or urban transport etc.) and sub-sectoral policy packages may be necessary.

Quantification of overall (sub-)sectoral emissions would probably be more straightforward than quantifying the impact of individual PAMs, but a challenge nevertheless. At least sub-sectors have relatively clear boundaries and actors involved, so that the development and transfer of methodologies to assess the performance of a sub-sector may be possible. It may still be necessary to support

the development of such methodologies, but once they are approved they could be more easily adapted and applied by all countries.

In summary, table 2 gives an analysis of the opportunities and threats related to the proposals. In the next section, a clear picture of what options could be best suited from a transport perspective is developed.

Table 2: Analysis of Options from a Transport Perspective (Summary)

Proposal	Analysis from a transport perspective	
	Opportunities	Threats
Sectoral No-Lose Targets and Crediting of NAMAs (AWG-KP and AWG-LCA)	<ul style="list-style-type: none"> • Create funding • Enhance project-based approach to policies 	<ul style="list-style-type: none"> • Difficulty to ensure a proper price in the carbon market (more stringent targets in Annex 1 needed) • Methodological Problems may be scaled up • Capturing low-cost options for industrialised countries
Development of standardized, multi-project baselines (AWG-KP)	<ul style="list-style-type: none"> • Emission standards may be a possible approach for technology-centred policies. 	<ul style="list-style-type: none"> • Difficult to find good indicators and easily accessible data • Exclusion of infrastructure and behaviour-centred measures (modal shift or demand reduction)
Differentiation of Project Types and/or Parties in the carbon market (AWG-KP)	<ul style="list-style-type: none"> • Negative lists increase the opportunities for transport projects • Excluding certain sectors in specific countries increases opportunities for the transport sector • Co-benefits requirements increase the opportunities of transport (competition advantage, especially of infrastructure / behaviour approach) 	<ul style="list-style-type: none"> • Additionality can hardly be defined by positive lists • Assessing co-benefits may increase costs
Sustainable development policies and measures and national low-carbon development plans and strategies (AWG-LCA)	<ul style="list-style-type: none"> • A strategic approach to policy making that enables policy packages suitable to influence transport • Overcome methodological problems by using sub-sectors as basic unit 	<ul style="list-style-type: none"> • Difficult to define the funding that is necessary to be provided by a mitigation fund.

4 Way forward: Suggestions for Copenhagen

After the COP 14 in Poznan in December 2008, Parties have now gone into “full negotiation mode”. 2009 will see five more negotiation sessions: in June, in August, in October, in November and finally in December in Copenhagen. Within this process, there are three main questions to be negotiated: What kind of efforts? How to organize funding? How to achieve implementation? In line with these questions, the following sections discuss the integration of sustainable transport in target setting, access to funding and effective institutions. The suggestions outline a position of how sustainable transport could be better integrated in the climate regime and thus, implementation of GHG reduction activities triggered.

4.1 Including Transport in Mitigation Activities

A precondition for enhancing climate change mitigation activities in developing countries are emission reduction targets by industrialised countries. Without such, no coordinated measures will be developed and no funding will be available for Non-Annex I countries. However, assuming that politicians are aware of the consequences of climate change and will agree on targets and measures in Copenhagen, it would be beneficial to explicitly mention the transport sector in any proposal. So far, the transport sector is not tackled sufficiently and the projected motorisation trends in developing countries show the challenge for effectively mitigating climate change

While international aviation and maritime shipping should be included in a joint, sectoral approach at UNFCCC-level, such as an international sectoral emission trading system or an international levy⁹, all other modes demand national efforts, both in industrialised and developing countries.

Industrialised countries will have to commit to quantitative reduction targets. This also includes their transport sector. In order to achieve the reduction targets, they have the possibility to balance the contribution of different sectors. Thereby it is possible to (a) define reduction targets for each sector or (b) co-ordinate

⁹ The introduction of a global sectoral agreement for aviation and maritime transport would have many advantages. A market based approach such as emissions trading can ensure cost-effective reductions. At the same time, the proceeds from auctioning allowances could supply financing for mitigation funds or facilitate technology transfer (EC 2009).

contributions through establishing an emission trading scheme (ETS or cap-and-trade carbon market). Australia, New Zealand and the USA plan to include transport in their trading systems (Tuerk et al 2009). On the other hand, the EU has so far excluded transport from its ETS (aviation starts in 2012) and instead set reduction targets for non-ETS sectors differentiated by countries. For example, Germany has to reduce GHG emissions in non-ETS-sectors until 2020 (compared to 2005) by 14% (-71.5 mill. tonnes). However, no formal sector-specific emission targets for transport have been defined, neither at EU-level nor in Germany¹⁰. As the first commitment period has shown, commitments to legally binding emission targets do not automatically mean that countries will in fact reduce their emissions. In most Annex II countries, emissions have increased, in some cases drastically, and Kyoto compliance is far from guaranteed.

Therefore, in addition to targets Annex I countries should develop target achievement plans (TAPs) and these should be submitted to an international review process. The modalities for the development and review of the TAPs should build on the modalities already in place for the development and review of national communications, GHG inventories etc. In addition, in its post-2012 communication the European Commission (2009) has proposed very concrete ideas for how to ensure that non-Annex I countries achieve a pre-defined level of mitigation, which could also be very usefully applied to Annex I countries (cf. Sterk et. al. 2009).

Developing countries indicated in Bali that they are willing to undertake additional nationally appropriate mitigation actions (NAMAs) and move beyond current efforts to limit emissions. Such NAMAs should include quantitative elements. From a transport perspective it is necessary to include requirements for having a sectoral breakdown of actions (including transportation) already in the agreement of Copenhagen, be it designing an open registry for NAMAs or setting up national low carbon development strategies (LCDS). Even if no concrete numbers or measures are set, the requirement of having a substantial share of reductions from the transport sector could be included in the guidelines for the elaboration of NAMAs. What kind of specific NAMAs will be eligible for funding could be agreed on before the system starts working in 2013. However, from a sustainable transport perspective, the debate about possible transport NAMAs should start as soon as possible and there is a strong need to collect ideas (see section 5).

¹⁰ The emission reduction targets as described are supplemented with other provisions and regulations. For instance, both the USA and EU have introduced quotas for renewable fuels. Aviation will be included in EU ETS from January 2012.

Box 2: Suggestion for Low Carbon Development Strategies (LCDS)

Based on the practice that is already in place for national communications (NCs) under the FCCC, Sterk et.al. (2009) suggest modalities for the elaboration and review of TAPs and low carbon development strategies (LCDS) in both industrialised and developing countries. These should:

- be organised by sectors and subdivided by greenhouse gas in order to avoid lost opportunities and lock-in to unsustainable infrastructures in any sector and/or gas. The following sectors should be considered: energy generation, transport, industry, buildings, agriculture, forestry, and waste management;
- include a robust assessment of the mitigation potential;
- include an elaboration of the costs and benefits of implementation and, where applicable, other constraints to implementation;
- be clearly differentiated between actions that the respective country can undertake from its own resources and actions where financial and technological support is required;
- for developing countries, comprise a detailed technology needs assessment to identify starting points for technology cooperation activities aiming at the diffusion of best technology available and joint R&D for even better technology;
- define credible pathways to limit emissions (only for industrialised countries and developing countries with high emissions or who are especially wealthy). To achieve this, a do nothing scenario should be contrasted by a projection with implementation of the strategy.

This means that all countries must define sector strategies for all sectors, including transport

4.2 Funding Sustainable Transport for Developing Countries

In 2007, the UNFCCC secretariat published a report on investment and financial flows (UNFCCC 2007), which illustrated a huge gap between the current climate related investment and financial flows, about 25 billion USD per year, and the additional investment needed in 2030 in developing countries, 130 billion USD, for mitigation activities to return 2030 emissions to current levels. The report also includes estimates for the transport sector in developing countries of in total 35.5 billion USD (27% of the overall additional mitigation investment needed) until 2030. These numbers include a high degree of uncertainty, as technology costs, e.g. of hybrid vehicles, might be overestimated and costs for implementing an infrastructure/behaviour oriented approach are missing.

Box 3: Investment and financial flows for transport

Investment and financial flows needed in 2030

The worldwide additional investment needed under the mitigation scenario is approximately USD 88 billion, of which USD 79 billion is for hybrid vehicles and efficiency improvements in vehicles and about USD 9 billion for biofuels. Of the total additional investment needed, developing countries and OECD countries account for approximately 40 per cent and 54 per cent respectively.

Current investment and financial flows

About two thirds of the investment is financed domestically, one sixth from FDI and one sixth is financed from international debt. In China, India, Mexico, South Africa and Brazil, domestic investment provided more than 90 per cent of transport investment. In 2000, most of ODA for the transport sector went to developing Asia, Latin America and Africa.

Source: UNFCCC 2007: 62

It is vital to establish a financial architecture that provides developing countries with sufficient financial flows for investments in order to support their activities to address climate change. The Bali Action Plan asks for adequate financial support from industrialised countries to developing countries. If funding instruments do not set incentives to include complex and maybe less cost-efficient measures, the structural under-representation of transport mitigation actions will continue. Hence, it is crucial to fulfil the BAP's commitment of linking funding to NAMAs. There are two main options: Using the carbon market or providing support through climate funds.

Using the Carbon Market

The carbon market that allows offsetting of industrialised countries emission targets is a major source of funding and should not exclude transport activities. However, it cannot be expected that the CDM will be a universal trigger for sustainable transport policies. Only activities that have clear boundaries and few stakeholders involved may overcome the barriers in proving additionality and generating an amount of CERs that really serve as an incentive for project developers. Linking NAMAs to the carbon market would further exacerbate the additionality problems of the CDM post-2012. It is nearly impossible to define whether the NAMAs would have been implemented in the absence of the climate regime. If these activities were credited under the CDM, measures taken anyhow would lead to allowing increasing emissions in industrialised countries¹¹.

Furthermore, many problems with the CDM in general are due to failures in the design of the mechanism, e.g. the non-additionality of many projects or the attractiveness of very cheap HFC-23 projects. Removing these failures may also promote transport projects under the CDM, especially as there are many co-benefits that make projects attractive to local decision-makers. Reforming the CDM towards a tool that will also support activities in the transport sector (but also e.g. the building sector) should include:

- Develop a new approach to determine the additionality of projects;
- Exclude cheap projects (e.g. HFC-23) from the CDM;
- Strengthen the assessment and importance of co-benefits.

Demonstrating the additionality of transport projects and quantifying their emission reductions requires overcoming significant methodological barriers at both the local and national level. Furthermore, transport expertise of the Methodologies Panel of the CDM Executive Board and other relevant bodies should be strengthened. The development of multi-project baselines will be a difficult task. As this may bind many resources and expert capacity, it is recommended to focus on the option of “measurement, reporting and verification” within a mitigation fund that does not include the requirement of additionality.

The best way forward to improve the environmental integrity of emissions trading with developing countries, which will for the foreseeable future probably not take place under legally binding caps as is the case for industrialised countries, may be to define sectoral or national “no-lose” targets (below BAU) that require a certain

¹¹ In a very recent submission of UNEP to the UNFCCC from April 24th, 2009, UNEP includes sectoral crediting of NAMAs and upscaling the CDM as a promising options to finance sustainable transport in addition to fund-based approaches. The authors of this paper believe, that even if crediting of NAMAs would provide funds for transport in developing countries, many methodological difficulties remain and offsetting targets of industrialised countries could jeopardise the achievement of the climate agreement

contribution of developing countries. Only when going beyond the target, CERs will be generated. However, this approach also faces many methodological problems.

Fund-Based Approaches

Funding for NAMAs not linked to the carbon market, i.e. climate funds, would achieve additional efforts of developing countries that would not be counted towards reduction obligations of industrialised countries. Hence, from the climate perspective less methodological requirements would be needed. Thus, this option would mean to alleviate methodological problems related to additionality but to activate substantial funding outside the carbon market. Setting up a fund or scaling up existing funds, however, demands strong efforts during the negotiation of the climate agreement. In addition, better transport data and reporting to the UNFCCC on transport in GHG emission inventories is necessary.

A carbon fund could not only finance policies but also sustainable transport projects at the local level. The lessons drawn from CDM experiences are that technical questions of proving quantified emission reductions and additionality are a major challenge to implementing more transport projects. However, the high investments into sustainable projects like e.g. BRT or light rail show that there is a strong interest of local stakeholders to improve transport systems. The difficulties of the project-based approach of the CDM are rather problems of the CDM procedure than a general problem of project-based activities. To the contrary, political experiences at the local level show that decision-making is very often bottom-up driven and project-related and not following comprehensive development strategies in a top-down manner. A fund would combine feasibility and adequacy: It is feasible because it enables finance for projects that are generally identified as part of low-carbon transport systems, e.g. BRT, cycle networks or compact city type land-use planning. It is adequate because measuring, reporting and verification can be fulfilled more easily by avoiding additionality testing.

So far, existing climate funds under the GEF only cover incremental costs, i.e. the difference between a less costly, more polluting option and a costlier, more environmentally friendly option. Determining incremental costs can be very complicated similar to the testing of additionality in the carbon market. Hence, designing a mitigation fund should take this into account and include streamlined provisions for determining incremental costs. Possible options include (a) simplified criteria and procedures for defining incremental costs, (b) disbursement of funds on a country rather than action basis, based on criteria for capability (c) a positive list of measures including a certain, pre-defined percentage of co-funding through the mitigation fund.

From a sustainable transport perspective a mitigation fund should explicitly refer to sustainable transport-related activities and require a certain share of funding for transport that makes it possible to meet the emission reduction targets towards 2050. A very recent submission of the United Nations Environmental Programme (UNEP 2009) to the UNFCCC proposed a Clean Transport Mechanism. This concept is not elaborated yet, but setting up a transport fund could be a promising option for fostering sustainable transport policies and projects.

Achieving technology transfer

In the BAP, the developing countries made their mitigation actions dependent on being “supported and enabled by technology, financing and capacity-building”. Thereby, financing technology transfer plays a major role. However, supporting sustainable livelihoods does not necessarily involve large investments, but also needs the right economic and regulative incentives. In this sense, parties should agree on a close co-operation and exchange of experience of North and South on how to strengthen sustainable mobility patterns, especially for infrastructure-/behaviour-centred strategies.

Including the principles of sustainable transport systems into land-use planning and infrastructure requires careful planning and advanced knowledge. Because infrastructure determines future behaviour of people to travel and move goods, it is crucial to act soon and to quickly adopt the principles of sustainable development and low-carbon infrastructure into planning processes. Such low-carbon infrastructure means that people unconsciously adopt mobility routines with low CO₂ emissions. Providing funds for such projects will be a strong incentive for local decision-makers to adopt a more sustainable transport policy. Hence, capacity building should be explicitly integrated in the agreement.

However, the Copenhagen agreement should also foster a transfer of vehicle energy efficiency technologies (technology-centred approach). For instance, the UNFCCC has estimated the impact of an increase of the market share of hybrid vehicles, along with increased bio fuel use and further improvement on efficiency of internal combustion engine (see Box 3). Developed countries should commit to provide the necessary additional investments and developing countries should commit to set the respective incentives and standards for technologies to be deployed, while transparently quantifying the corresponding climate impact.

4.3 Conclusion for Copenhagen

Suggestions for a future climate agreement should be based on principles based on lessons learnt from sustainable transport systems and climate policy. From a sustainable transport perspective, two principles should be considered when setting a framework for transport in developing countries and thus prevent the repetition of the same trends that happened in the industrialised world:

- Go beyond projects and include policy (policy packages) in order to achieve sustainable transport systems that avoid transportation demands and offer high-quality alternatives to cars and trucks.
- Provide capacity and funding that enable action that is effective also in the long-term.

From a climate perspective, there are another two principles to consider when talking about integrating transport in the climate regime:

- Provide appropriate and predictable resources.
- Ensure environmentally sound and cost-effective measures

Based on these four principles, the **main conclusion** is that the climate regime should foster the establishment of policy packages that include both infrastructure/behavioural and technology approaches through a mitigation fund financed by industrialised countries that enables national policies, as well as local project-related activities. In addition, the carbon market could be improved in order to ensure that transport projects become more competitive.

In order to ensure an appropriate recognition of transport, the total volume of funding available for transportation measures should correspond to the significance of the sector. The funds provided for transport measures in each country should therefore reflect the projected share of its GHG emissions. For example, the Parties could agree to take the IEA's projections as a basis.

In order to ensure cost-effectiveness, the mitigation fund should only provide co-funding. The fund could be directly related to NAMAs and be managed by an authority under the conference of the parties and the UNFCCC. The NAMAs that receive funding should be officially registered at the UNFCCC and embedded in a national low carbon development strategy. Such an LCDS should clearly state the inclusion of the transport sector and define the sub-sectors of transport (goods vs passenger transport / local vs. long distance transport).

A fund-based approach would also mean that the additionality requirement would be less important since emission reductions achieved in developing countries would not count towards emission targets of industrialised countries. This would

facilitate the development of baselines and quantification (MRV). The definition of incremental costs should be facilitated. What measuring of transport projects could look like is roughly explained in section 5.

Sectoral crediting or crediting of NAMAs is not recommended, especially when not having strong emission reduction targets in industrialised countries. Weak targets including offsetting within the global carbon market means that resources are less predictable (decreasing price per tonne CO₂) and there is a danger of not meeting the global reduction needs.

In summary, there are five features the upcoming climate agreement should include from a transport perspective:

1. Clearly include the transport sector in mitigation efforts: The sector's importance should be highlighted and a significant contribution required. In General, funding for transport should reflect the projected share of its GHG emissions.
2. Set up a mitigation fund that provides finance for NAMAs that are registered and embedded in a low carbon strategy including a section on transport. It must be ensured that emission reductions and funding of NAMAs is quantifiable. A set of simple and evident funding criteria could replace requirements to prove additionality and/or incremental costs.
3. Request target achievement plans from industrialised countries and low carbon development strategies from developing countries that clearly include measures related to the transport sector.
4. Reform the carbon market and introduce market correcting factors (like, e.g., discounting for HFC23 projects) in order to increase the competitiveness of transport projects. However, NAMAs should preferably not be included in the carbon market.
5. Give local projects access to the mitigation fund in order to ensure support for measures that do not fit under the CDM.

A key role in all actions is the provision of reliable data and institutions with a high capacity to evaluate NAMAs and low carbon development strategies. In order to quantify emission reductions, the creation of transportation data is crucial. Such data not only document measures but are highly valuable for overall urban development and strengthen the capacity of local decision-makers in developing countries. However, the question of data also shows that having an agreement in Copenhagen can only be the first step. The global implementation of transport policies is probably much more difficult than achieving a global agreement.

5 Outlook: How to Prepare for Implementation?

Assuming that the agreement of Copenhagen will include the elements described above, transport actors have to carefully prepare its implementation in order to make the agreement work. Based on the above, there will be a need to

- a) define policies and measures,
- b) develop LCDS or policy packages for all (sub-) sectors,
- c) prepare the quantification of emissions, and
- d) build up the capacity of local stakeholders in order to facilitate access to the new tools.

Thereby the preparation to implement the Copenhagen agreement will take place at the international, national and local level: The **international level** shall be the arena to define and to further elaborate typical policies and policy packages. The parties should initiate an intensive dialogue among transport decision makers, experts and other stakeholders which aims at elaborating a comprehensive knowledge database about how to foster sustainable transport and, more specifically, how to reduce transport-related GHG emissions.

Furthermore, it should be distinguished between **national and local activities**: While the national level can better focus on technology support and long distance transport, the local level can include behaviour-related measures for both goods and passenger transport mainly by planning and building infrastructures. Taking all these issues into account, four areas of advanced action can be identified (open list):

1. National technology-centred energy efficiency policies (targeting both passenger and goods transport)
2. National infrastructure/behaviour focussed policies for long distance goods transport (road, rail, shipping)
3. National infrastructure/behaviour focussed policies for long distance passenger transport (road, rail, aviation)
4. Local infrastructure/behaviour focussed policies for passenger and goods transport

Even if others will be added or the scope defined differently, such areas help to outline lists of policies and measures that contribute to GHG emission reductions

and can be the basis for appropriate policy packages. Policy packages shall be designed to be actor specific and to overcome country specific barriers for implementation. Thus they may vary from one country to the other but include similar elements. E.g. urban transport plans may include parking policies, road tolls, public transport, infrastructure for non-motorized modes, etc. At the international level a systematic approach to provide such information is needed.

For each of these policy packages (areas), a methodology able to establish a baseline and evaluate its climate impact would have to be elaborated and agreed on. So even if the concrete policies summarised in one package are different from country to country, the methodology to measure the emission reductions would be the same or based on the same principles. This approach would facilitate measuring, reporting and verification of NAMAs to a great extent. Finally, as soon as a country introduced an eligible policy package, i.e. a NAMA, and provide the data to measure the impacts, it would receive funding from the mitigation fund according to the investments needed, the country's own financial capability and the climate impact.

The evaluation of a NAMA's climate impact should rely on a robust baseline. But the definition of a business-as-usual development could be based on overall indicators. In the end, this is indeed a political decision. It is hardly possible to objectively determine technology learning curves that would have occurred without certain policies or to exactly quantify the impact of a policy on a consumer's decision-making process. The establishment of a sectoral no-lose target (see section 3) is a good example for such politically agreed baselines. However, as long as the establishment of a baseline is based on similar criteria, the distribution of funding can be considered equitable. For example, Annex 2 outlines a recent proposal of how to evaluate a package of national policies to foster passenger car energy efficiency in Europe.

The implementation of transport NAMAs would have to be prepared at the national level. This includes the transfer of knowledge on how to design policy packages from the international level to the domestic executive bodies. Such capacity building would also include formal aspects of how to access funding. Most importantly, developing countries would have to set up an appropriate greenhouse gas inventory in order for the NAMAs to be MRV. The greenhouse gas inventory would include information such as fuel carbon contents and vehicle kilometres travelled by fuel and technology type. The evaluation methodologies would most likely demand additional socio-economic data. In order to start mitigation action in 2013, the preparation of inventories should start as soon as possible. It may take years to collect the data.

From 2013, countries that introduced NAMAs could clearly demonstrate their mitigation efforts. The mitigation fund capital, to be paid by industrialised countries, would flow to the decision makers responsible for implementing a certain NAMA package. Developing countries would not only benefit from additional financial flows, but could also learn from each other about effectiveness and efficiency of certain policies and measures. Consequently, this learning process would lead to further policy packages, which would be better adjusted to the national circumstances. As the transport sector considerably builds upon local action, cities and municipalities should also start mitigation activities and initiate a learning process at the local level.

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Annex 1: CDM Methodologies

Approved Transport Related CDM Methodologies (2009, February, 26th)

Nr.	Title	Description	Scale	Type
AM0031	Baseline Methodology for Bus Rapid Transit Projects (applied in Bogota)	Improvement of urban mobility via more efficient bus transit system	large	Modal shift + energy efficiency
AMS-III.C.	Emission reductions by low-greenhouse gas emitting vehicles	Replacement of low-GHG emitting vehicles by low-GHG emitting vehicles	small	Energy efficiency
AMS-III.S.	Introduction of low-emission vehicles to commercial vehicle fleets	Replacement of low-GHG emitting by low-GHG emitting vehicles for commercial passenger and freight transport	small	Energy efficiency
AMS-III.T.	Plant oil production and use for transport application	Switch to plant-oil fuel for transportation	small	Fuel switch
AMS-III.U	Cable Cars for Mass Rapid Transit System (MRTS)	Substitution of road based trips by cable car trips	small	Modal shift + energy efficiency

Source: UNFCCC CDM Statistics (<http://cdm.unfccc.int/Statistics/index.html>)

Transport Related CDM Methodologies in the Pipeline (2009, February, 26th)

Nr.	Title	Description	Scale	Type
NM0266	Mumbai Metro One, India	Improvement of public transportation in Metropolitan Mumbai Region by a mass rapid transit system	large	Modal shift + energy efficiency
NM0258	Metrobus Insurgentes, Mexico City	Mass transit system along Insurgentes Avenue and mass urban transport system based on exclusive bus lanes.	large	Modal shift + energy efficiency
SSC-NM006	Cable Cars for Public Transit	Substitution of road based trips by cable car trips	small	Modal shift + energy efficiency
SSC-NM019	Transportation Energy Efficiency Activities using Retrofit Technologies	Use of retrofit emission reducing technology in existing/used vehicles for commercial passenger	small	Energy efficiency

Source: UNFCCC CDM Statistics (<http://cdm.unfccc.int/Statistics/index.html>)

Annex 2: A Proposal for Evaluating Energy Efficiency Improvement Policies of Cars

The EU Directive on energy end-use efficiency and energy services (2006/32/EC) has raised concerns among Member States about how they could evaluate energy saving measures in order to contribute to achieving the indicative target of 9% energy savings from 2008 to 2017. Therefore, evaluation methods have been proposed. In the transport sector, proposals how to evaluate vehicle energy efficiency and modal shifts in passenger transportation have been elaborated.

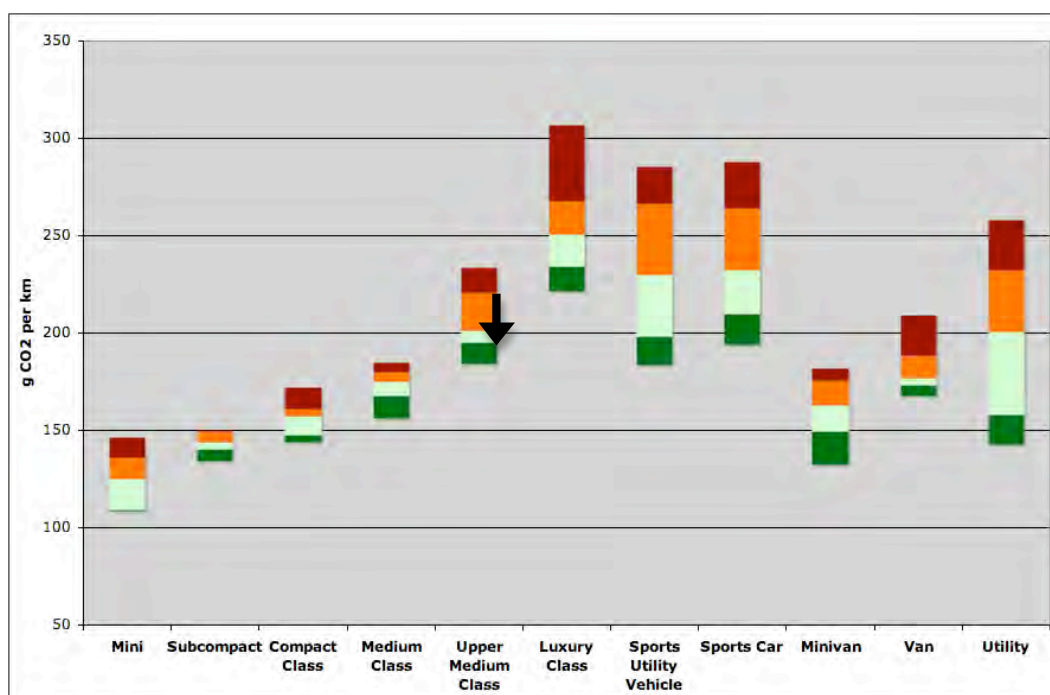
Rudolph and Böhrer (2009) propose a bottom-up methodology with top-down elements to evaluate a package of policies aiming at fostering passenger car energy efficiency. It is assumed that without the policy package, a consumer would rather buy inefficient cars within one car segment. Hence, the consumer prefers a certain segment, e.g. upper medium class cars, and within this segment he/she decides on an energy efficient model because of the policy package. The authors propose the threshold between efficient and inefficient cars to be the average CO₂ emission per kilometre of all newly registered cars within one segment in a certain year under evaluation.

In a **first step**, the energy savings that are induced by each energy efficient car (below average/baseline) are calculated by subtracting the average emissions of newly registered efficient cars from the average emissions of newly registered inefficient cars within this segment. The figure below illustrates this approach to calculate energy savings, using a statistic about car registrations in Germany in 2007. The statistic distinguishes between car models and their respective CO₂ emissions per km. The borders between the light red and the dark red areas signify the average of inefficient cars, whereas the border between the light green and the dark green areas set the average of energy efficient cars.

In a **second step**, the number of new cars registered emitting less than the threshold between efficient and inefficient would be counted. E.g., if the consumer decides for an energy efficient upper medium class car, then he/she induces 25.5 g CO₂ reductions per km. If the national average annual vehicle distance is 12,000 km and if in this respective year 50,000 new energy efficient cars (below baseline) are registered, then 15,300 tonnes CO₂ are reduced (step 1 and 2 for upper medium class cars).

In a **third step**, the methodology stipulates to apply gross-to-net correction factors, as in the first two steps only the gross CO₂-reductions are calculated. However, the consumer could have chosen to purchase an energy efficient car anyway, i.e. without the additional incentives of the policy package. Data basis could be a survey. In a **final step**, the energy saving lifetime could be set by taking the average lifetime of cars in the respective country at the time of deregistration.

Figure A: Approach to establish a baseline and to calculate energy savings



Source: based on Rudolph and Böhler 2009